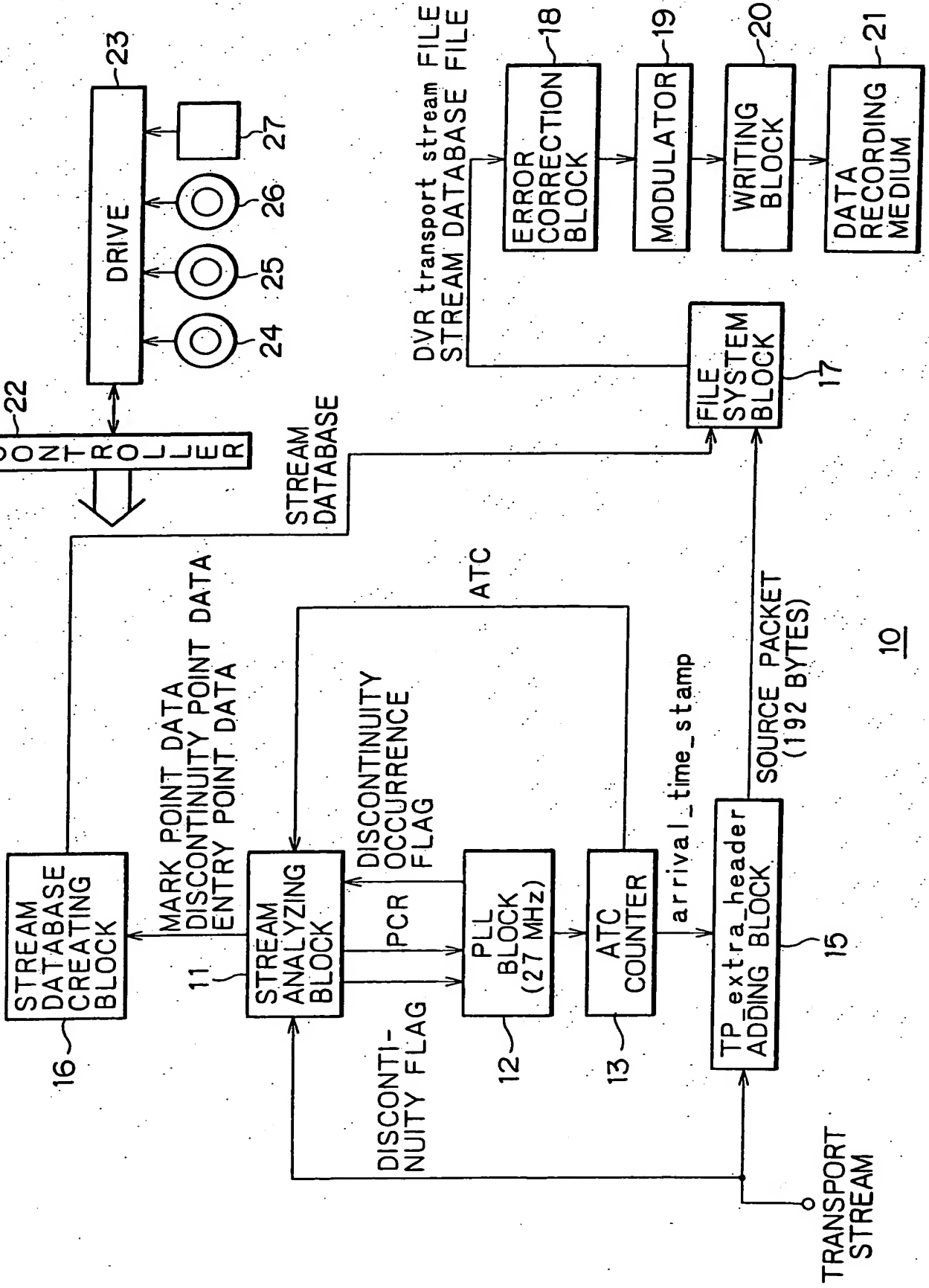
FIG.1


TRANSPORT STREAM
TP_extra_header ADDING BLOCK
15
SOURCE PACKET (192 BYTES)
arrival_time_stamp
ATC COUNTER
13
PLL BLOCK (27 MHz)
12
PCR
DISCONTINUITY OCCURRENCE FLAG
DISCONTI-NUITY FLAG
STREAM ANALYZING BLOCK
11
MARK POINT DATA
DISCONTINUITY POINT DATA
ENTRY POINT DATA
STREAM DATABASE CREATING BLOCK
16
ATC
STREAM DATABASE
FILE SYSTEM BLOCK
17
DVR transport stream FILE
STREAM DATABASE FILE
ERROR CORRECTION BLOCK
18
MODULATOR
19
WRITING BLOCK
20
DATA RECORDING MEDIUM
21
CONTROLLER
22
DRIVE
23
24
25
26
27
10

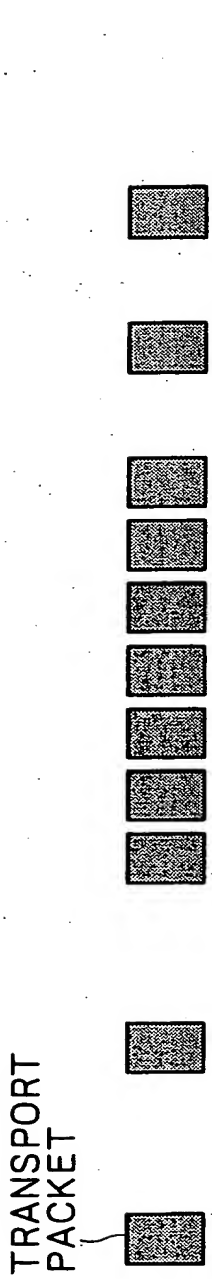


FIG. 2A

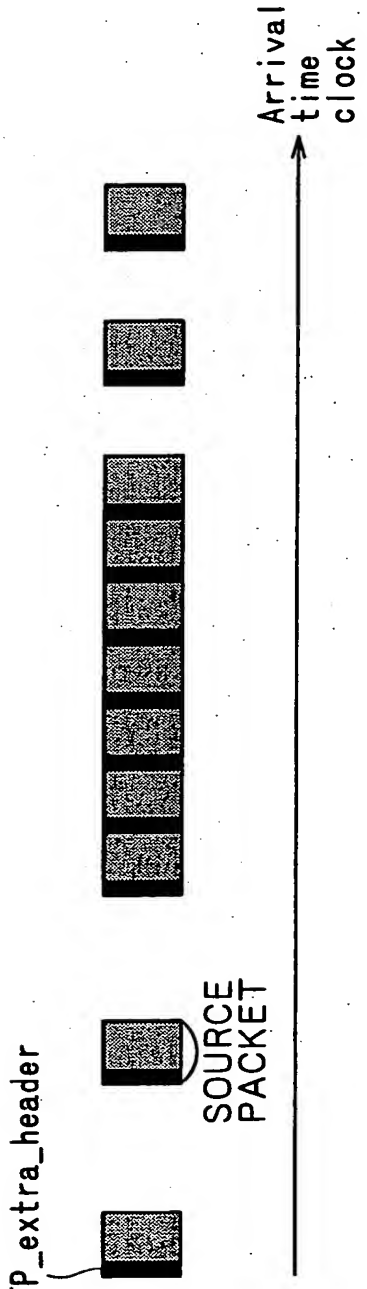


FIG. 2B

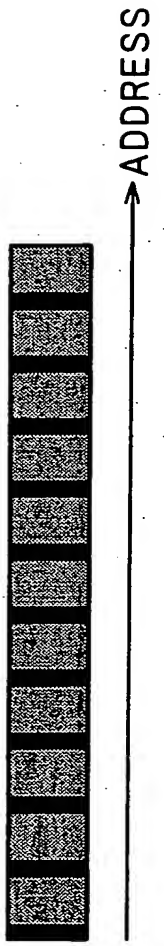


FIG. 2C

FIG. 3

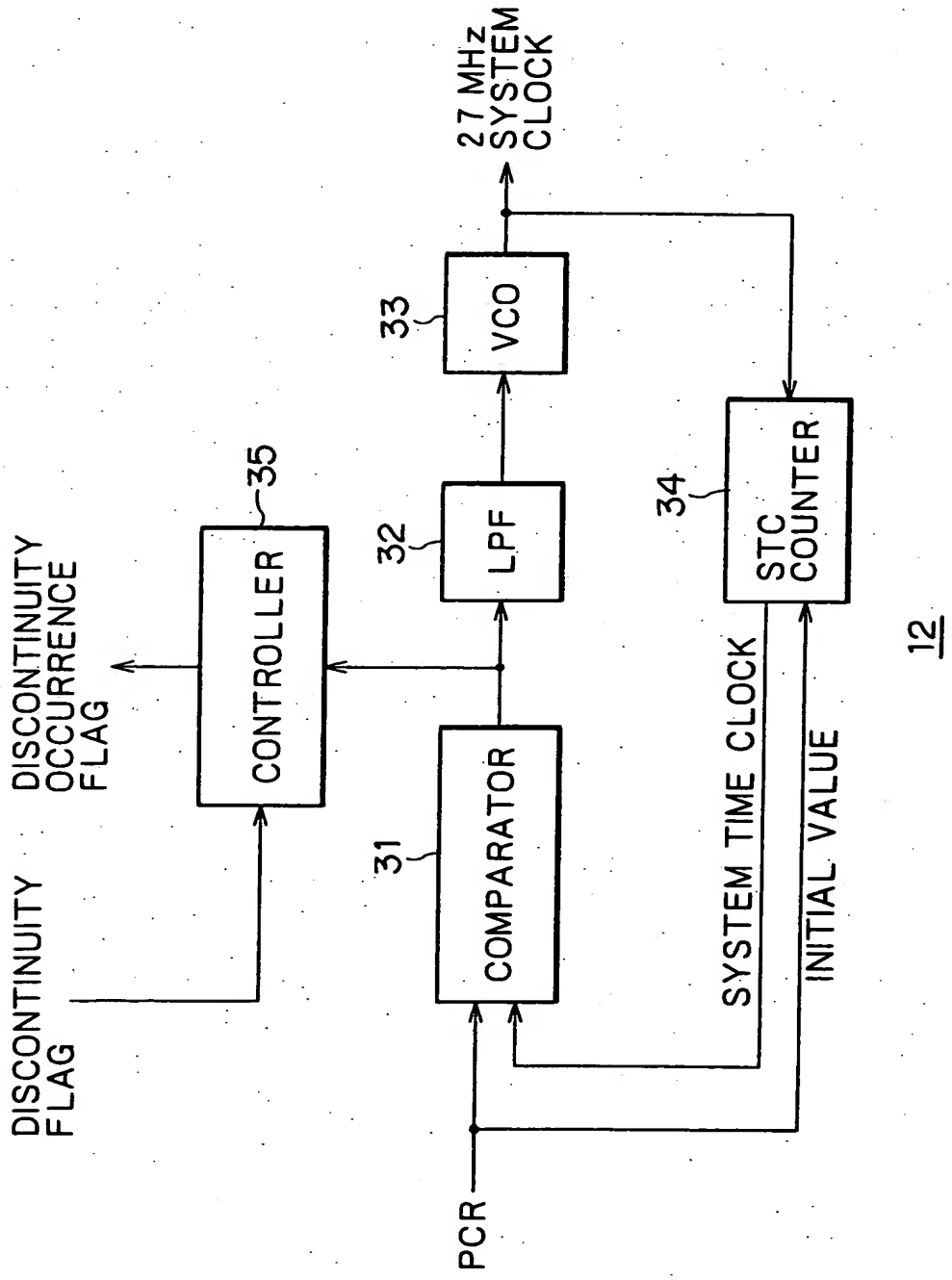

27 MHz SYSTEM CLOCK
33
VCO
35
CONTROLLER
32
LPF
34
STC COUNTER
DISCONTINUITY OCCURRENCE FLAG
DISCONTINUITY FLAG
31
COMPARATOR
SYSTEM TIME CLOCK
INITIAL VALUE
PCR
12

FIG. 4

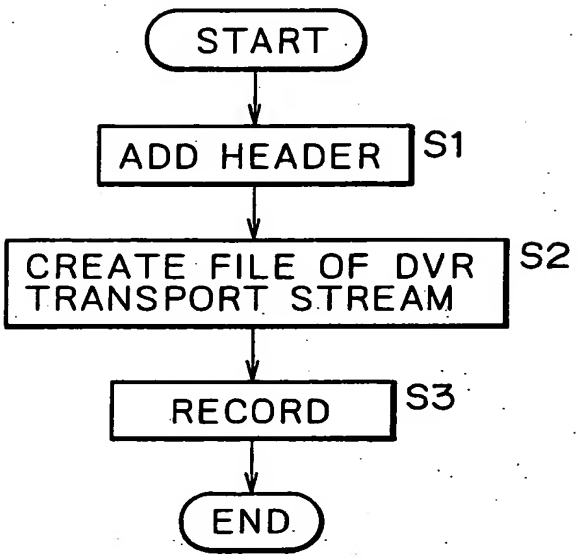

START
ADD HEADER
S1
CREATE FILE OF DVR TRANSPORT STREAM
S2
RECORD
S3
END

FIG. 5

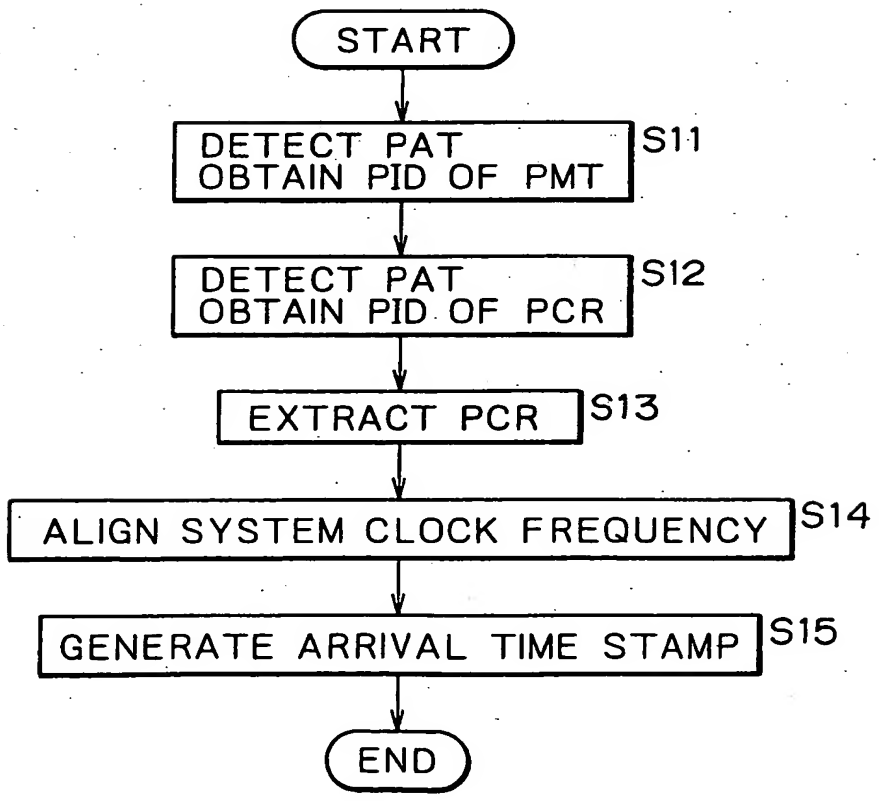

START
DETECT PAT
OBTAIN PID OF PMT
S11
DETECT PAT
OBTAIN PID OF PCR
S12
EXTRACT PCR
S13
ALIGN SYSTEM CLOCK FREQUENCY
S14
GENERATE ARRIVAL TIME STAMP
S15
END

FIG. 6

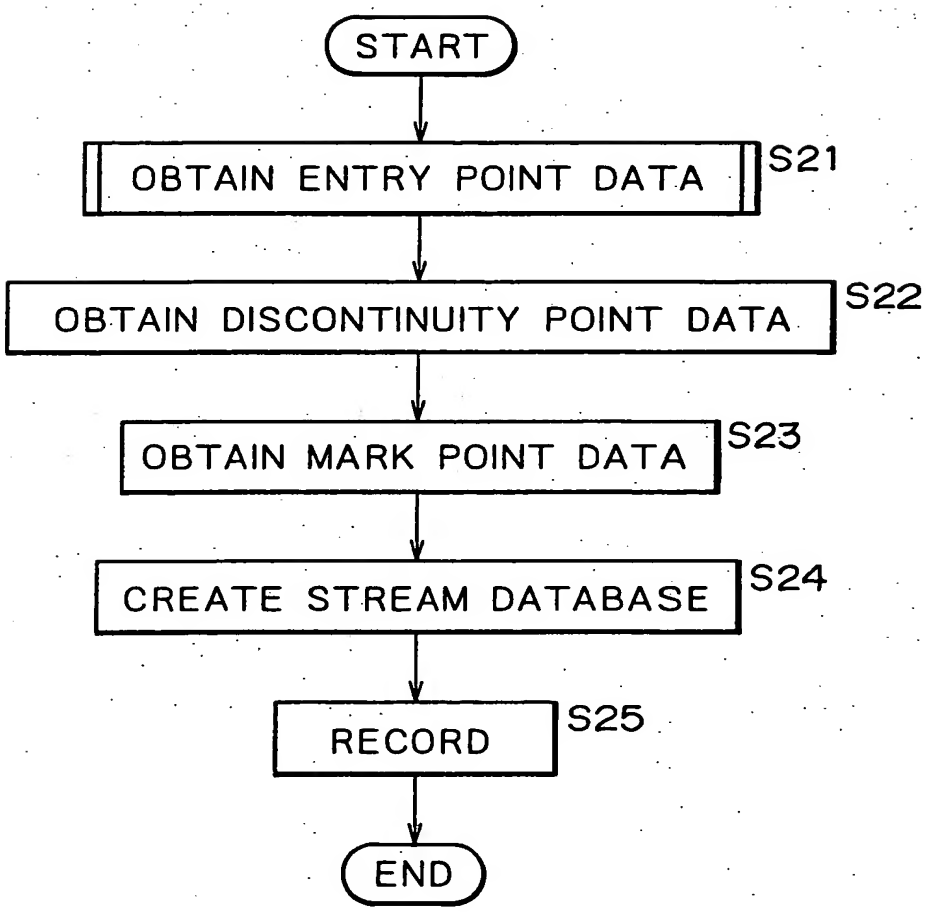

START
OBTAIN ENTRY POINT DATA
S21
OBTAIN DISCONTINUITY POINT DATA
S22
OBTAIN MARK POINT DATA
S23
CREATE STREAM DATABASE
S24
RECORD
S25
END

FIG. 7

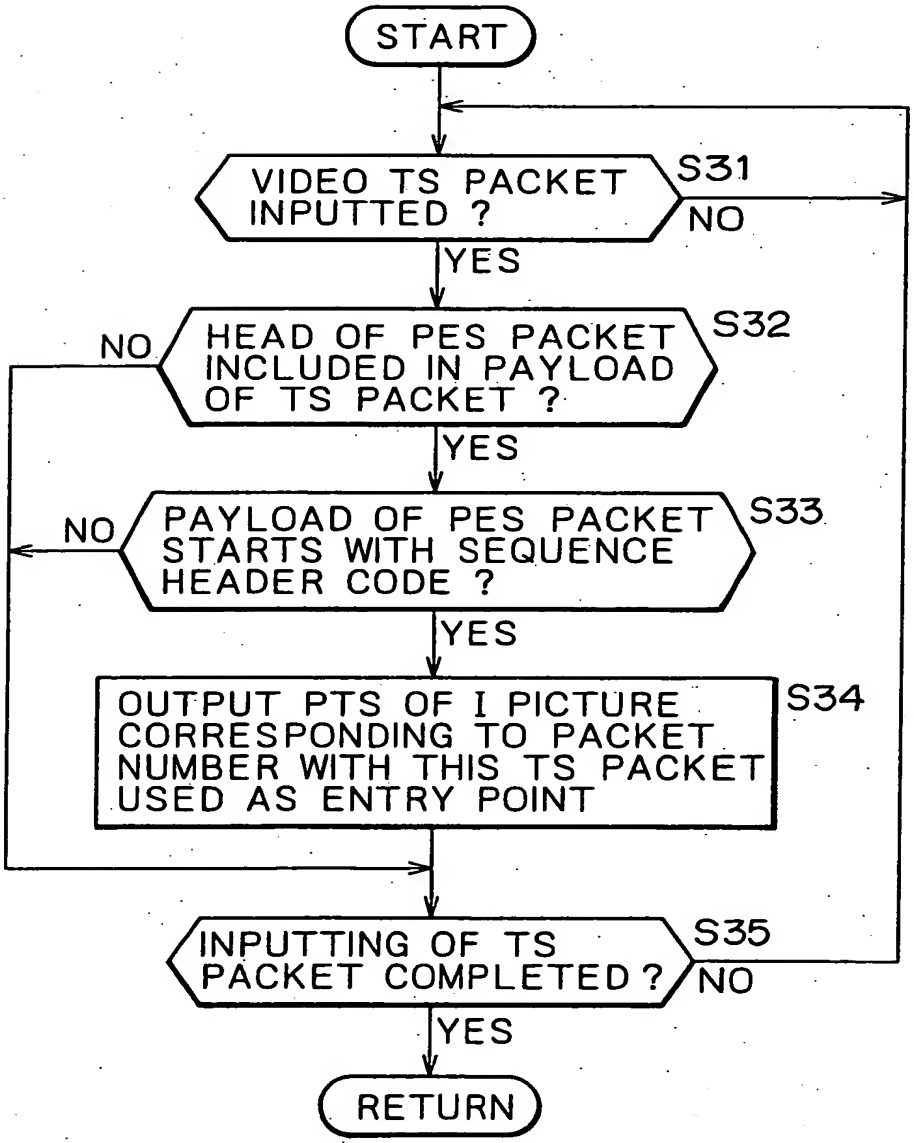

START
VIDEO TS PACKET INPUTTED ?
S31
NO
YES
HEAD OF PES PACKET INCLUDED IN PAYLOAD OF TS PACKET ?
S32
NO
YES
PAYLOAD OF PES PACKET STARTS WITH SEQUENCE HEADER CODE ?
S33
NO
YES
OUTPUT PTS OF I PICTURE CORRESPONDING TO PACKET NUMBER WITH THIS TS PACKET USED AS ENTRY POINT
S34
INPUTTING OF TS PACKET COMPLETED ?
S35
NO
YES
RETURN

FIG. 8

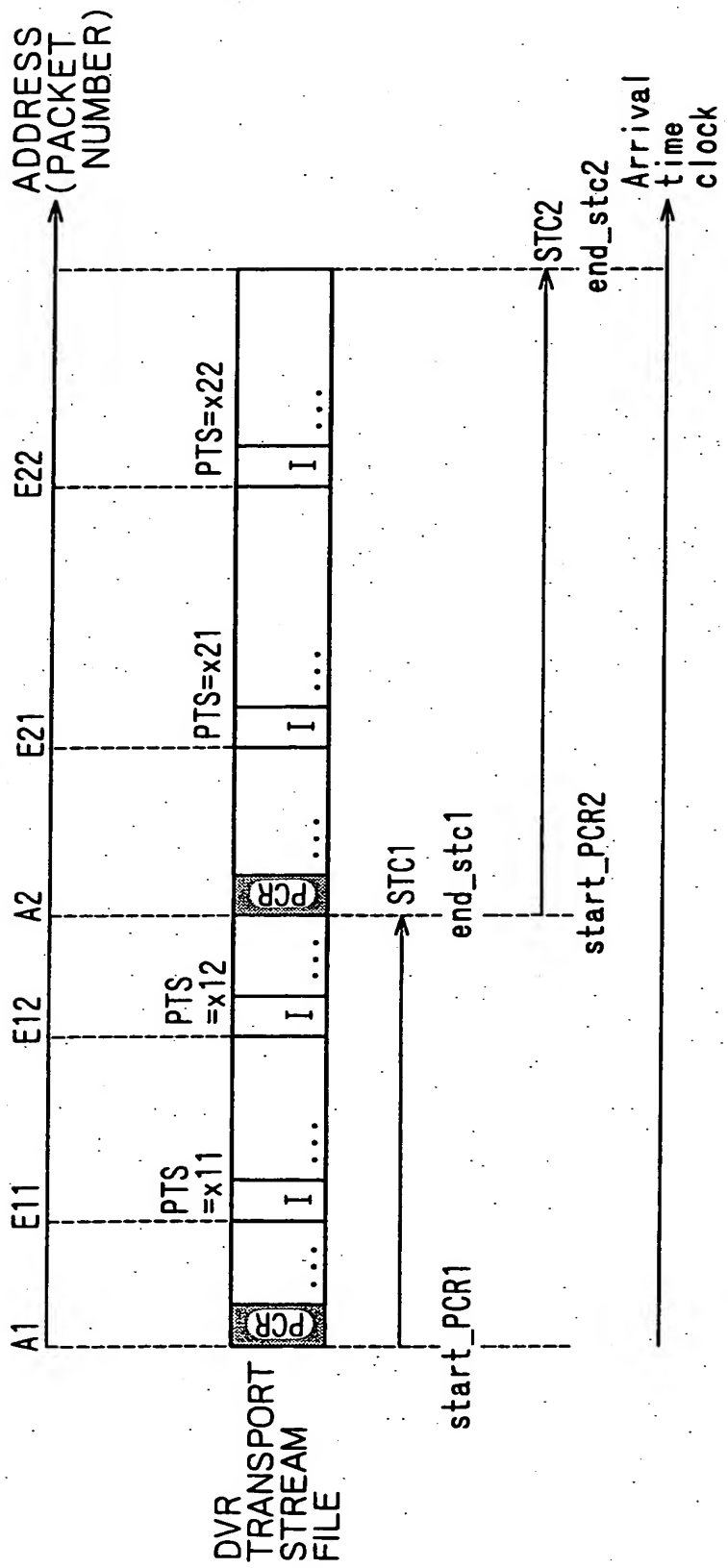

ADDRESS (PACKET NUMBER)
Arrival time clock
A1
E11
E12
A2
E21
E22
PTS =x11
PTS =x12
PTS=x21
PTS=x22
PCR
I
STC1
STC2
start_PCR1
end_stc1
start_PCR2
end_stc2
DVR TRANSPORT STREAM FILE

FIG. 9

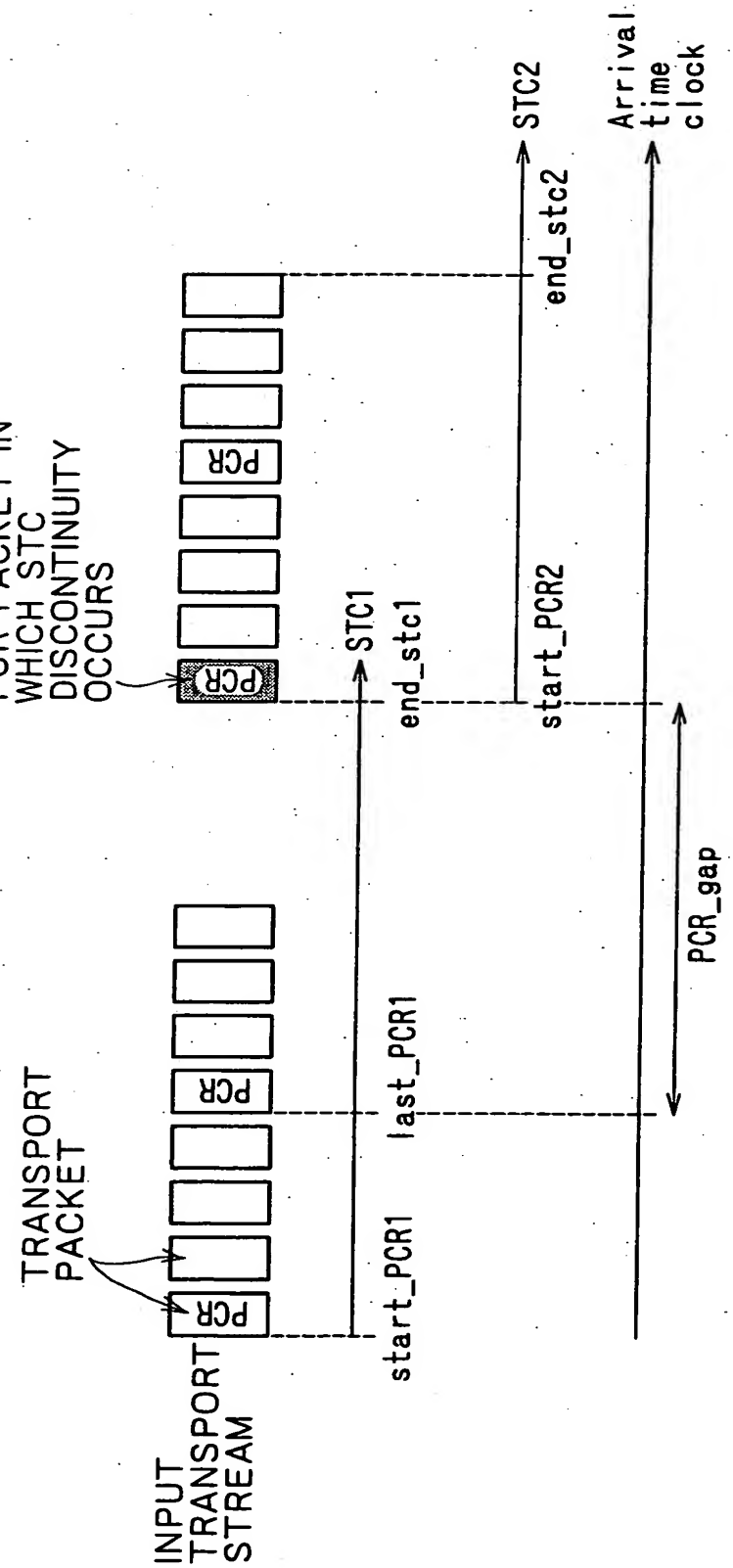

INPUT TRANSPORT STREAM
TRANSPORT PACKET
PCR
PCR
PCR
PCR PACKET IN WHICH STC DISCONTINUITY OCCURS
start_PCR1
last_PCR1
end_stc1
STC1
start_PCR2
end_stc2
STC2
PCR_gap
Arrival time clock

FIG.10

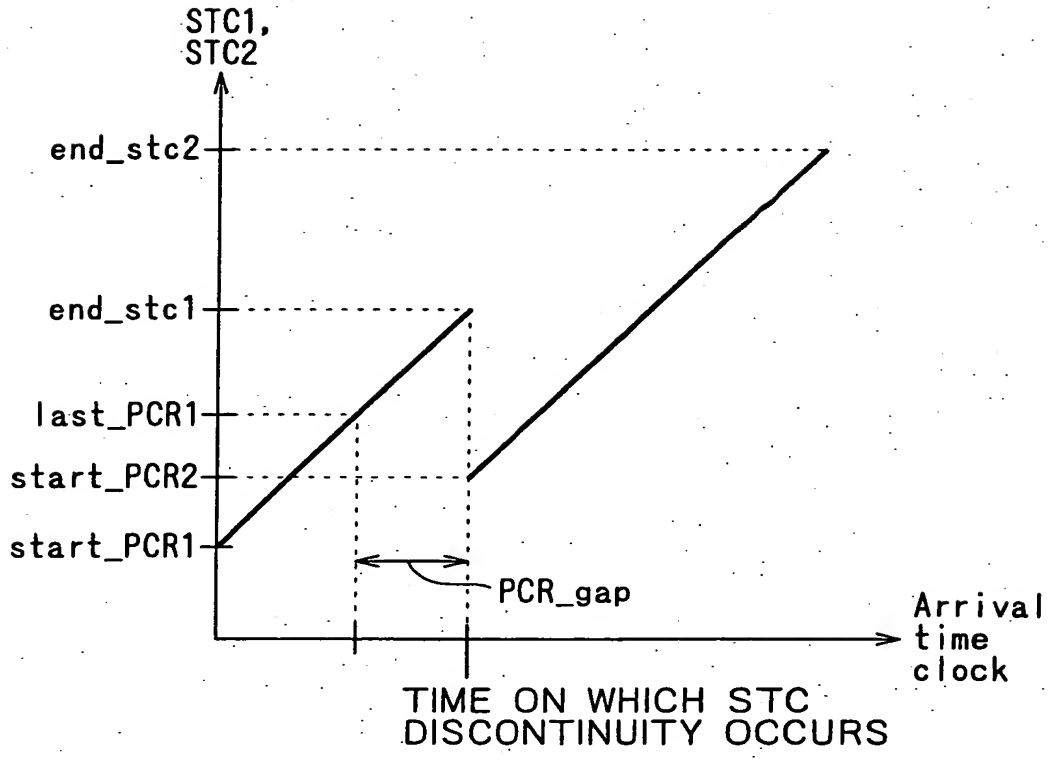

STC1,
STC2
end_stc2
end_stc1
last_PCR1
start_PCR2
start_PCR1
PCR_gap
Arrival
time
clock
TIME ON WHICH STC
DISCONTINUITY OCCURS

FIG.11

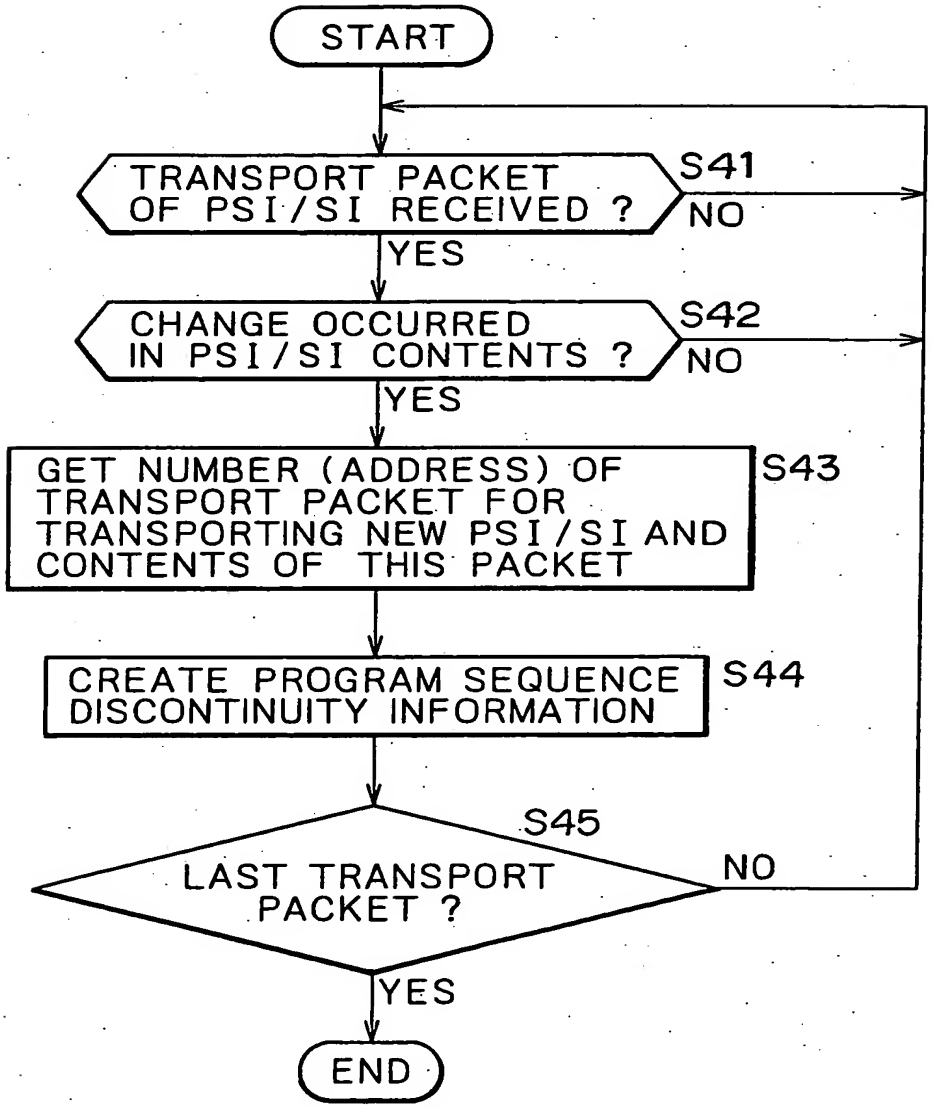

START
TRANSPORT PACKET OF PSI/SI RECEIVED ?
S41
NO
YES
CHANGE OCCURRED IN PSI/SI CONTENTS ?
S42
NO
YES
GET NUMBER (ADDRESS) OF TRANSPORT PACKET FOR TRANSPORTING NEW PSI/SI AND CONTENTS OF THIS PACKET
S43
CREATE PROGRAM SEQUENCE DISCONTINUITY INFORMATION
S44
S45
LAST TRANSPORT PACKET ?
NO
YES
END

FIG.12

video_PID	
offset_source_packet_number	
PTS OF ENTRY POINT (PTS_EP_start)	ADDRESS OF ENTRY POINT (RSPN_EP_start)
x 1 1	E 1 1
x 1 2	E 1 2
x 2 1	E 2 1
x 2 2	E 2 2

ENTRY POINT MAP

FIG.13

STC TIME AXIS ID (STC_sequence_id)	PCR_PID	start_PCR_value	end_STC_value	RSPN_STC_start
# 1	X	start_PCR 1	end_stc 1	A 1
# 2	Y	start_PCR 2	end_stc 2	A 2

STC TIME AXIS INFORMATION

OBLON, SPIVAK, ET AL
DOCKET #: 247987US-6 DIV
INV: Motoki KATO, et al
SHEET 12 of 25

FIG.14

Syntax	No. of bits
STC_Info(){	
length	32
num_of_STC_sequence	8
for(i=0;i<num_of_STC_sequence;i++){	
STC_sequence_id	16
PCR_PID	16
RSPN_STC_start	32
reserved	31
start_PCR_value	33
reserved	31
end_stc_value	33
}	
}	

FIG.15

Syntax	No of bits
STC_Info() {	
version_number	8*4
Length	32
if(length !=0) {	
num_of_STC_sequence	8
offset_STC_sequence_id	8
for(STC_sequence_id=offset_STC_sequence_id ; STC_sequence_id<(num_of_STC_sequence+ offset_STC_sequence_id) ; STC_sequence_id++) {	
RSPN_STC_start	32
start_PTS	64
end_PTS	64
}	
}	
}	

FIG.16

Syntax	No. of bits
ProgramInfo() {	32
length	16
number_of_PSI_SI_change	
for(i=0; i<number_of_PSI_SI_change; i++){	
PSI_SI_type	8
if(PSI_SI_type==PAT){	
start_PAT_address	32
}	
else if (PSI_SI_type==PMT){	
program_map_PID	16
start_PMT_address	32
program_number	16
PCR_PID	16
number_of_videos	8
number_of_audios	8
for (k=0; k<number_of_videos; k++){	
video_PID	16
VideoCodingInfo()	
}	
for (k=0; k<number_of_audios; k++){	
audio_PID	16
audioCodingInfo()	
}	
}	
else if (PSI_SI_type==SIT){	
start_ SIT_address	32
}	
}	
}	

FIG.17

Syntax	No. of bits
ProgramInfo(){	
version_number	8*4
Length	32
if(length !=0){	
Reserved	8
Number_of_program_sequence	8
for (i=0;i<number_of_program_sequence;i++){	
RSPN_program_sequence_start	32
reserved	32
program_map_PID	16
PCR_PID	16
number_of_videos	8
number_of_audios	8
for (k=0;k<number_of_videos;k++){	
video_stream_PID	16
VideoCodingInfo()	
}	
for (k=0;k<number_of_audios;k++){	
audio_stream_PID	16
AudioCodingInfo()	
}	
}	
}	
}	

ProgramInfo – Syntax

FIG.18

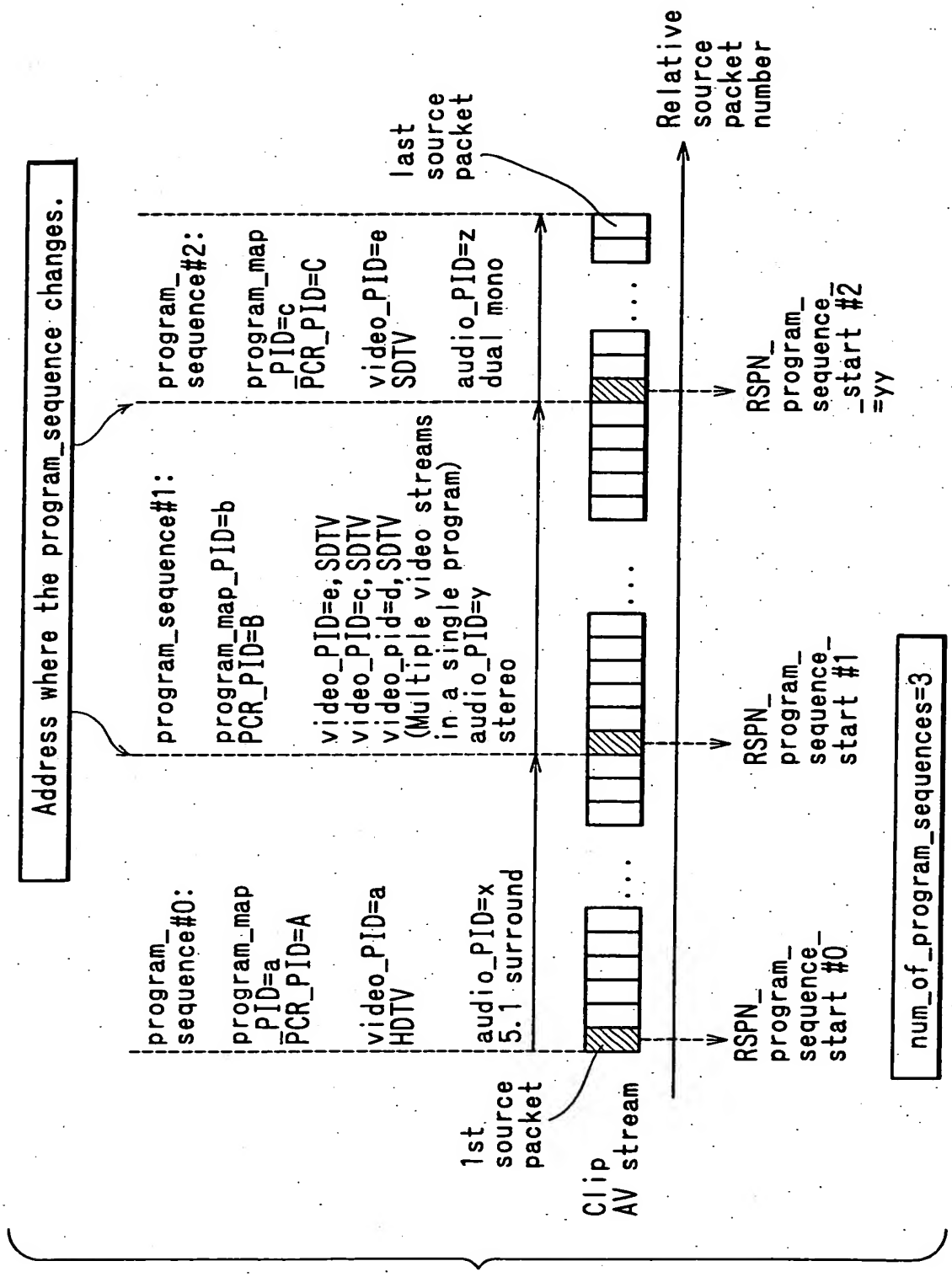

Address where the program_sequence changes.
program_sequence#0:
program_map_PID=a
PCR_PID=A
video_PID=a
HDTV
audio_PID=x
5.1 surround
program_sequence#1:
program_map_PID=b
PCR_PID=B
video_PID=e, SDTV
video_PID=c, SDTV
video_pid=d, SDTV
(Multiple video streams in a single program)
audio_PID=y
stereo
program_sequence#2:
program_map_PID=c
PCR_PID=C
video_PID=e
SDTV
audio_PID=z
dual mono
1st source packet
last source packet
Clip AV stream
Relative source packet number
RSPN_program_sequence_start #0
RSPN_program_sequence_start #1
RSPN_program_sequence_start #2=yy
num_of_program_sequences=3

FIG.19

Syntax	No. of bits
EntryPointMap() {	
length	32
offset_source_packet_number	32
number_of_video_streams	16
for (i=0; i<number_of_video_streams; i++) {	
reserved	3
video_PID	13
number_of_entry_points	32
for(j=0; j<number_of_entry_point; j++) {	
PTS_EP_start	32
RSPN_EP_start	32
}	
}	
}	

FIG.20

Syntax	No. of bits
ClipMark() {	
version_number	8*4
Length	32
number_of_Clip_marks	16
for (i=0; i<number_of_Clip_marks; i++) {	
Reserved	8
Mark_type	8
Mark_time_stamp	32
STC_sequence_id	8
Reserved	24
}	
}	

Mark – SYNTAX

FIG.21

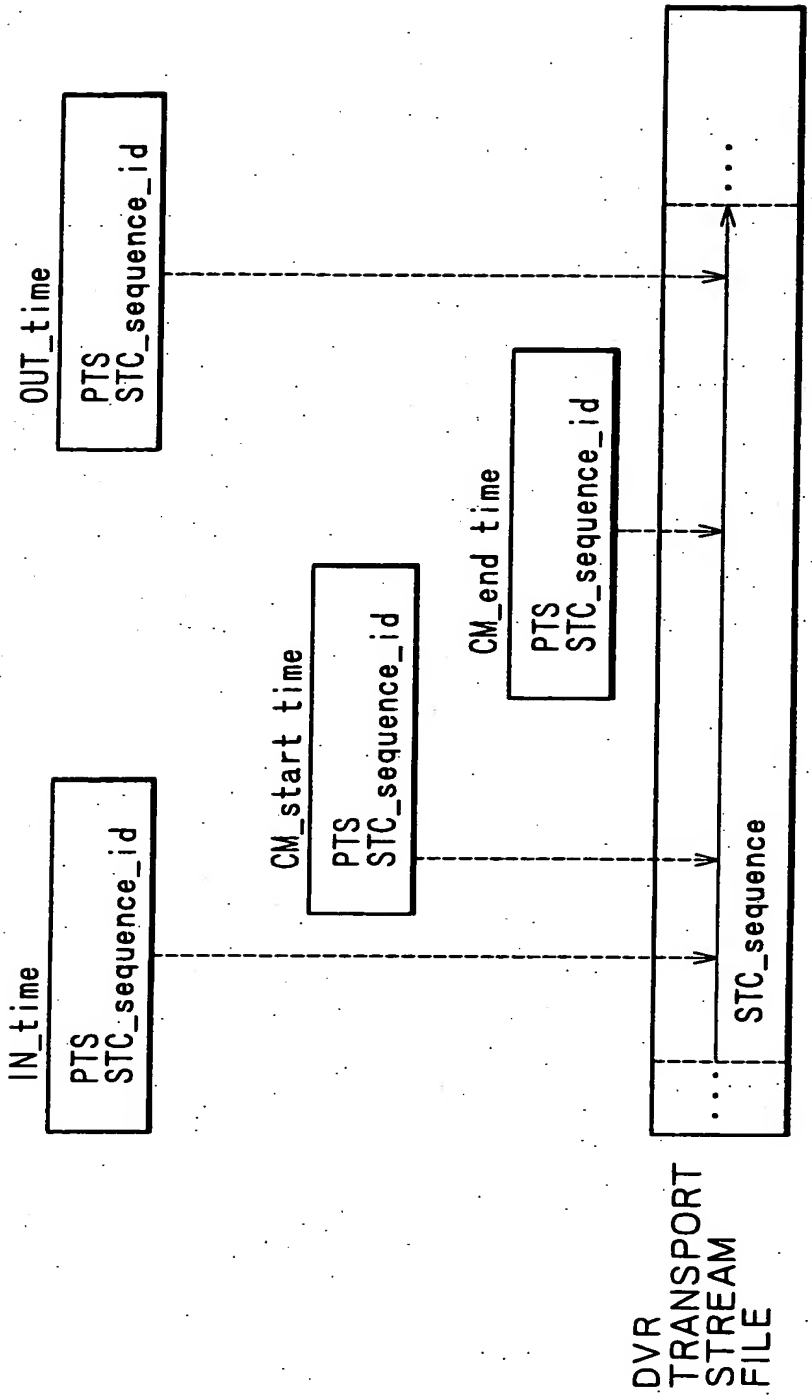
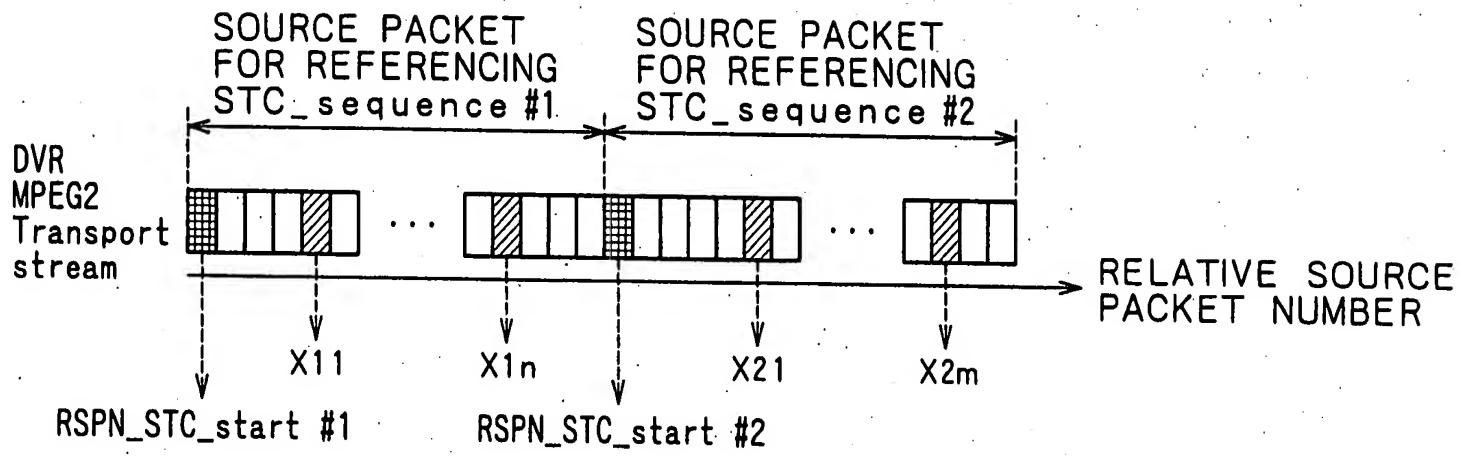

IN_time
PTS
STC_sequence_id
CM_start time
PTS
STC_sequence_id
CM_end time
PTS
STC_sequence_id
OUT_time
PTS
STC_sequence_id
STC_sequence
DVR
TRANSPORT
STREAM
FILE

FIG.22



: SOURCE PACKET INCLUDING BYTE 1 OF SEQUENCE HEADER OF VIDEO STREAM REFERENCED BY video_PID = x

: SOURCE PACKET TO BE REFERENCED BY RSPN_STC_start STORED IN STC_Info

EntryPointMap
video_PID=x

PTS_EP start	RSPN_EP start
pts(x11)	X11
...	...
pts(x1n)	X1n
pts(x21)	X21
...	...
pts(x2m)	X2m

THESE DATA BELONG TO STC_sequence #1

BOUNDARY

THESE DATA BELONG TO STC_sequence #2

RSPN_STC_start #2 < X21

OBLON, SPIVAK, ET AL
DOCKET #: 247987US-6 DIV
INV: Motoki KATO, et al
SHEET 20 of 25

FIG. 23

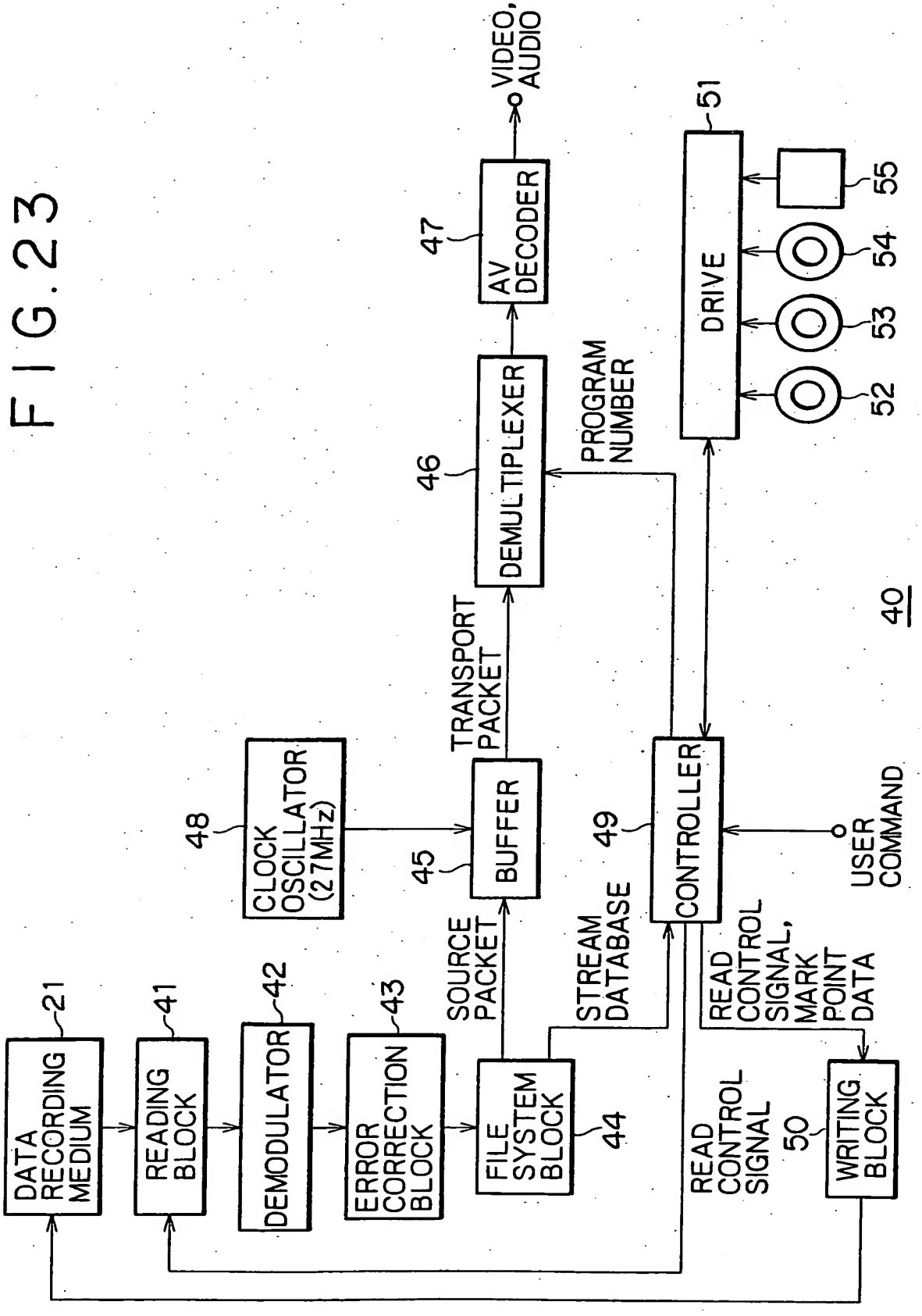

DATA RECORDING MEDIUM
21
READING BLOCK
41
DEMODULATOR
42
ERROR CORRECTION BLOCK
43
FILE SYSTEM BLOCK
44
SOURCE PACKET
STREAM DATABASE
READ CONTROL SIGNAL, MARK POINT DATA
READ CONTROL SIGNAL
WRITING BLOCK
50
CLOCK OSCILLATOR (27MHz)
48
BUFFER
45
TRANSPORT PACKET
DEMULTIPLEXER
46
PROGRAM NUMBER
AV DECODER
47
VIDEO, AUDIO
CONTROLLER
49
USER COMMAND
DRIVE
51
52
53
54
55
40

FIG. 24

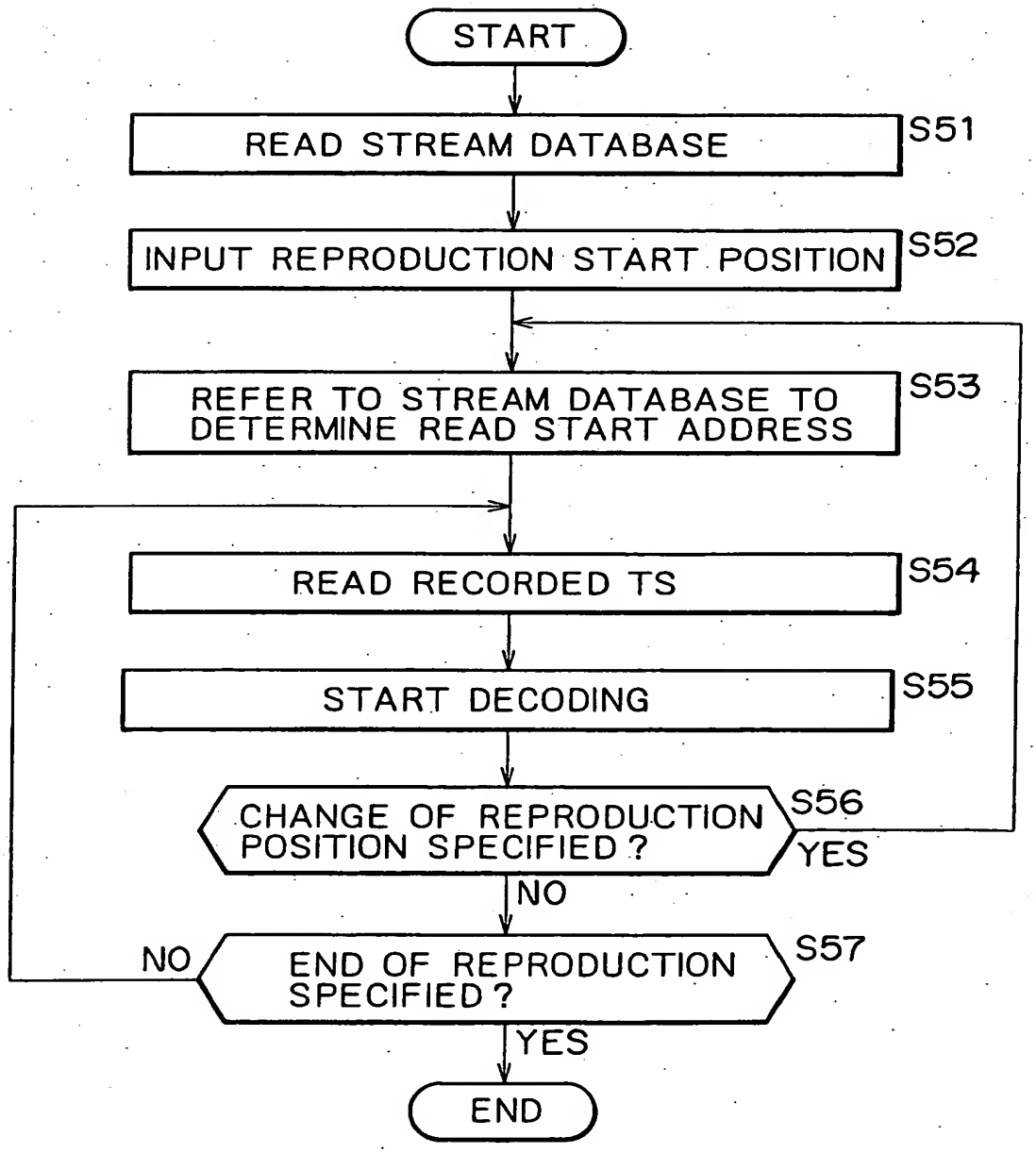

START
READ STREAM DATABASE
S51
INPUT REPRODUCTION START POSITION
S52
REFER TO STREAM DATABASE TO DETERMINE READ START ADDRESS
S53
READ RECORDED TS
S54
START DECODING
S55
CHANGE OF REPRODUCTION POSITION SPECIFIED ?
S56
YES
NO
NO
END OF REPRODUCTION SPECIFIED ?
S57
YES
END

FIG.25A

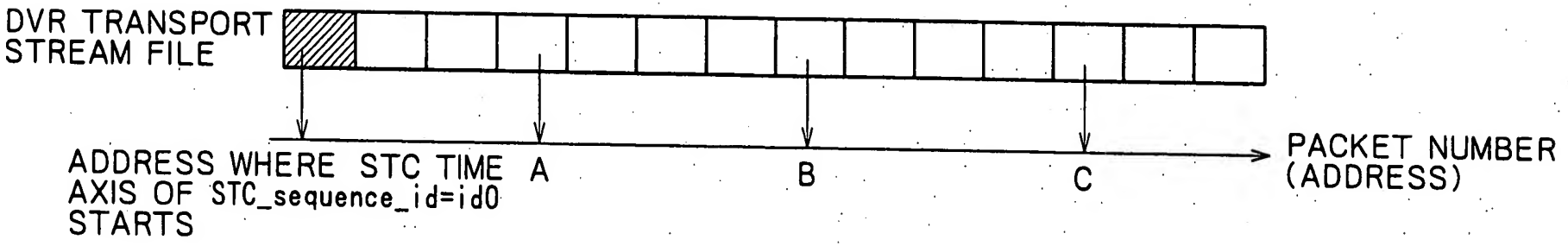


FIG.25B

EntryPointMap

RSPN_EP_start	PTS_EP start
A	PTS(A)
B	PTS(B)
C	PTS(C)
...	...

FIG.25C

ClipMark

Mark_type	Mark_Time_stamp	STC_sequence_id
CMstart	PTS(a0)	id0
CM end	PTS(c0)	id0

OBLON, SPIVAK, ET AL
DOCKET #: 247987US-6 DIV
INV: Motoki KATO, et al
SHEET 23 of 25

FIG. 26

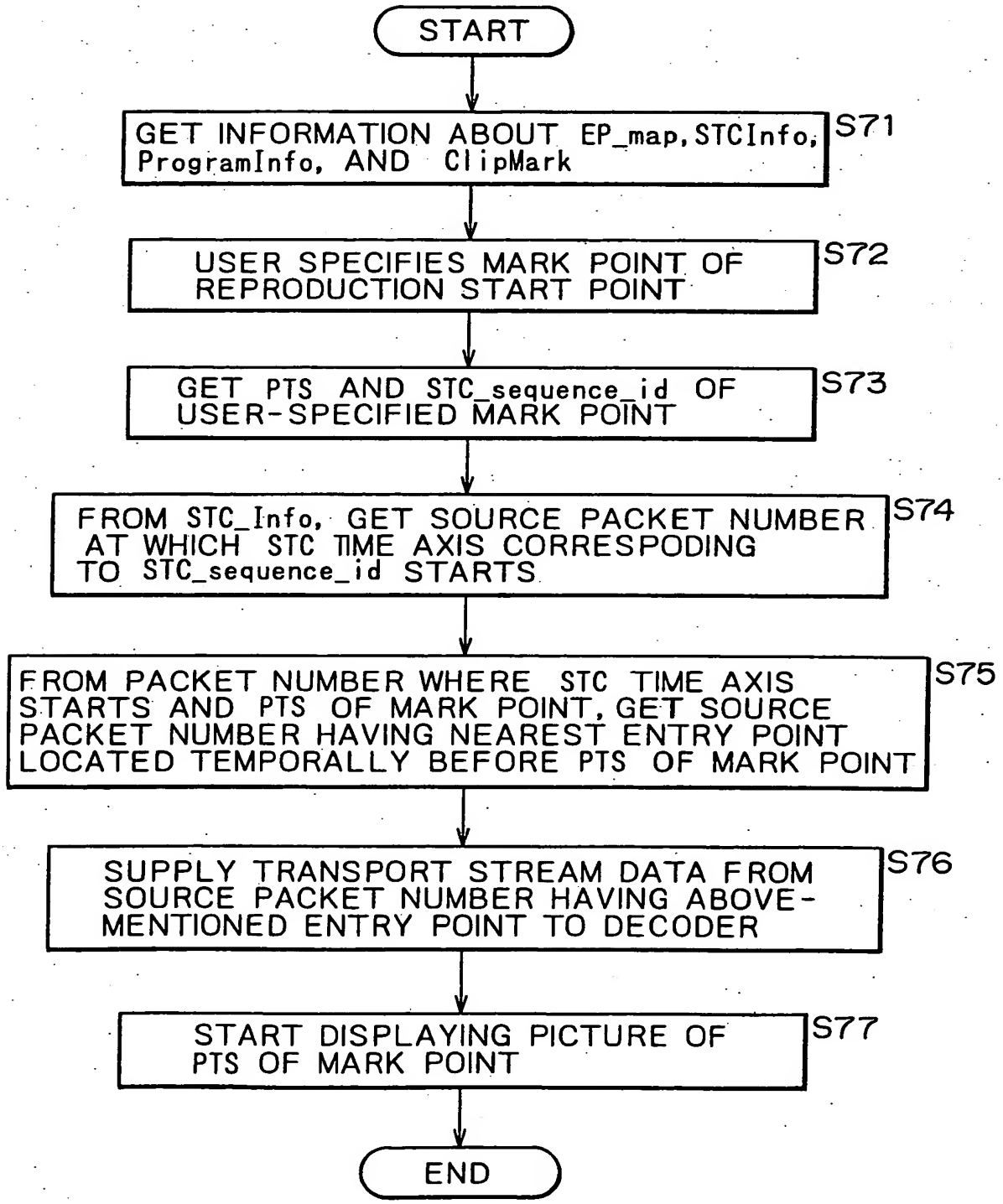
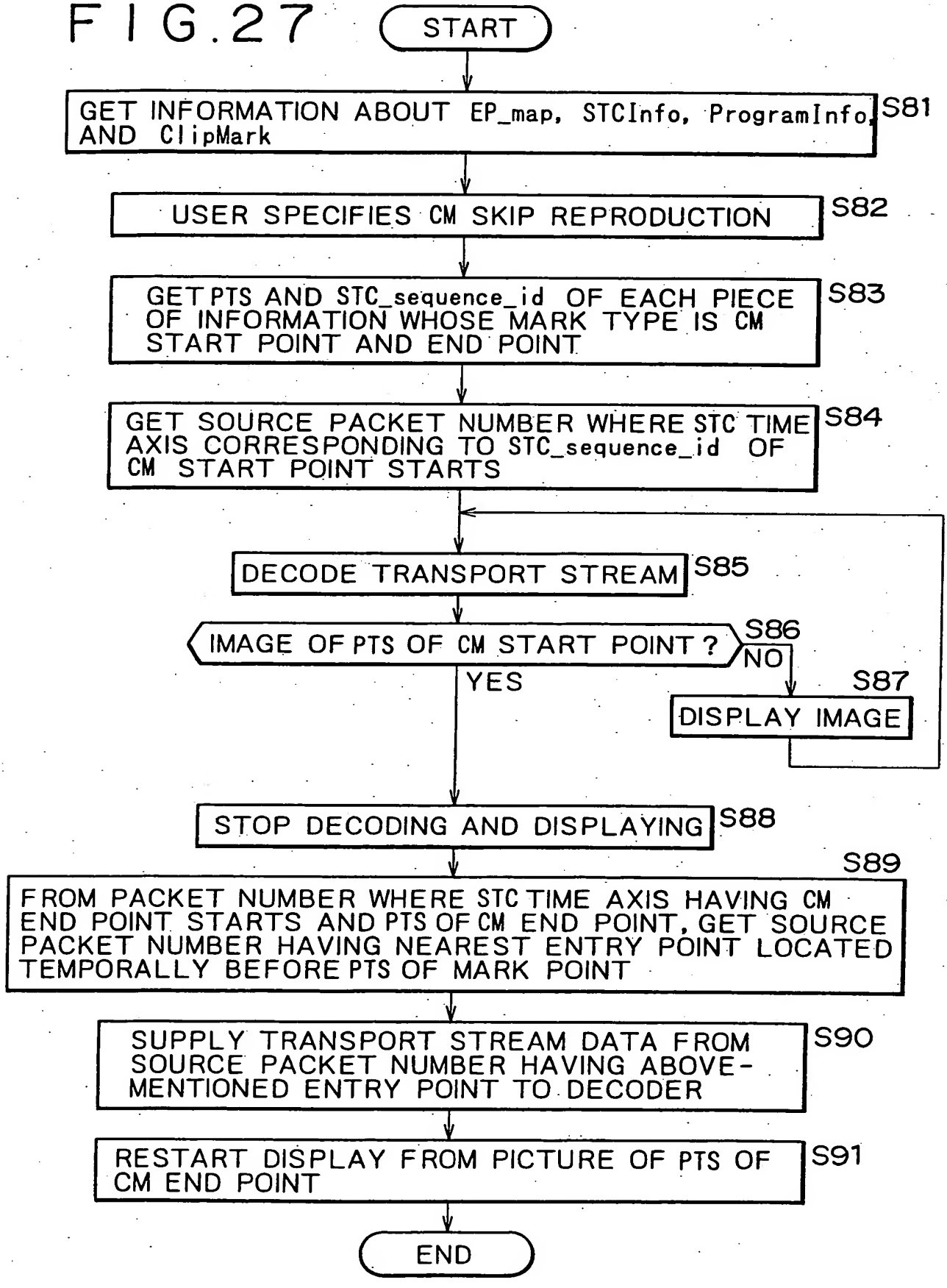

START
GET INFORMATION ABOUT EP_map, STCInfo, ProgramInfo, AND ClipMark
S71
USER SPECIFIES MARK POINT OF REPRODUCTION START POINT
S72
GET PTS AND STC_sequence_id OF USER-SPECIFIED MARK POINT
S73
FROM STC_Info, GET SOURCE PACKET NUMBER AT WHICH STC TIME AXIS CORRESPODING TO STC_sequence_id STARTS
S74
FROM PACKET NUMBER WHERE STC TIME AXIS STARTS AND PTS OF MARK POINT, GET SOURCE PACKET NUMBER HAVING NEAREST ENTRY POINT LOCATED TEMPORALLY BEFORE PTS OF MARK POINT
S75
SUPPLY TRANSPORT STREAM DATA FROM SOURCE PACKET NUMBER HAVING ABOVE-MENTIONED ENTRY POINT TO DECODER
S76
START DISPLAYING PICTURE OF PTS OF MARK POINT
S77
END

FIG.27


START
GET INFORMATION ABOUT EP_map, STCInfo, ProgramInfo, AND ClipMark
S81
USER SPECIFIES CM SKIP REPRODUCTION
S82
GET PTS AND STC_sequence_id OF EACH PIECE OF INFORMATION WHOSE MARK TYPE IS CM START POINT AND END POINT
S83
GET SOURCE PACKET NUMBER WHERE STC TIME AXIS CORRESPONDING TO STC_sequence_id OF CM START POINT STARTS
S84
DECODE TRANSPORT STREAM
S85
IMAGE OF PTS OF CM START POINT ?
S86
NO
YES
DISPLAY IMAGE
S87
STOP DECODING AND DISPLAYING
S88
FROM PACKET NUMBER WHERE STC TIME AXIS HAVING CM END POINT STARTS AND PTS OF CM END POINT, GET SOURCE PACKET NUMBER HAVING NEAREST ENTRY POINT LOCATED TEMPORALLY BEFORE PTS OF MARK POINT
S89
SUPPLY TRANSPORT STREAM DATA FROM SOURCE PACKET NUMBER HAVING ABOVE-MENTIONED ENTRY POINT TO DECODER
S90
RESTART DISPLAY FROM PICTURE OF PTS OF CM END POINT
S91
END